

# **Wildlife Mortality Incidents Caused by Pesticides: An Analysis of the EIIS Database**

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## **Introduction**

The Ecological Incident Information System (EIIS) is an EPA database of documented incidents of nontarget wildlife, fish, and plants being harmed by pesticide use in the United States. The database is maintained by the Environmental Fate and Effects Division of the Office of Pesticide Programs. The EIIS contains information extracted from written reports of incidents that voluntarily submitted to the EPA by state agencies and other federal agencies. The database currently contains over 2915 records. This analysis examines incidents involving effects on terrestrial wildlife (birds, mammals, and reptiles). Incidents are mainly of wildlife mortality, although a few incidents involve animals that were debilitated but later recovered. This analysis includes only incidents which were convincing linked to a particular pesticide (i.e., incidents given a certainty index of “probable” or “highly probable”), and excludes incidents that were attributed to misuse of pesticides. It should be noted that most incidents are not reported and investigated, or the report fails to be submitted to the EPA. Thus, the numbers presented in this poster represent only a small sample of the incidents occurring. Nevertheless, this analysis of EIIS data provides unique insight into patterns and causes of wildlife poisoning by pesticides in the United States.

The majority of reported wildlife mortality incidents are caused by organophosphorous (OP) and carbamate insecticides. Anticoagulant rodenticides and avicides are responsible for most of the remaining incidents. Organochlorine insecticides, most of which are now banned, continue to cause some incidents. Herbicides and fungicides cause few wildlife mortality incidents, despite being widely used.

The treatment site is the crop or area to which the pesticide is applied. For over half of the incidents records in the database, the treatment site is either unknown or identified only as being an agricultural site, without identification of the crop. More in-depth investigation of wildlife mortality incidents is needed to improve the identification of treatment sites in incident reports.

Wildlife mortality incidents commonly occur not only from agricultural use of pesticides, but also from nonagricultural uses in residential areas, in urban areas, and on golf courses. In fact, home/lawn is the most frequent reported treatment site. Although this may be partially attributed to better reporting of these types of incidents, it nevertheless demonstrates the high risk of some pesticides commonly used around homes. In particular, the use diazinon for grub control, brodifacoum for rodent control, and chlorpyrifos for termite control frequently results in wildlife mortality. The agricultural sites with the most reported wildlife incidents are corn, grapes, rice, alfalfa, and wheat. Incidents are likely numerous on corn, alfalfa, and wheat because these crops provide food resources that attract birds, especially waterfowl. Similarly, birds are attracted to the artificial wetlands created by rice culture. The count of incidents on grapes was inflated by numerous incidents reported by a monitoring program conducted in vineyards. This survey found that many birds were killed after drinking irrigation water treated with carbofuran.

A handful of very hazardous insecticides, rodenticides, and avicides cause the majority of wildlife mortality incidents. Carbofuran, a carbamate insecticide widely used on various agricultural row crops, has been the single worst killer of wildlife, both in terms number of reported incidents and total number of reported casualties. Diazinon, an OP insecticide used primarily on home lawns, and fenthion, an OP avicide and insecticide, also are associated with very large numbers of wildlife incidents and deaths. The EPA canceled the use of diazinon on golf courses in 1989, but it is still widely used on lawns and other turf sites. The EPA has recently canceled the avicide product of fenthion, Rid-a-Bird<sup>®</sup>, which has caused numerous kills of nontarget birds. The remaining active uses of fenthion are adult mosquito control in Florida and livestock insecticide treatments, uses which pose less risk to wildlife. Other pesticides which have caused many incidents are the rodenticide brodifacoum, the OP insecticides chlorpyrifos and ethyl parathion, and the now banned organochlorine insecticides chlordane and dieldrin. Many casualties of wildlife are also associated with use of phorate and fensulfothion.

The number of incidents and casualties associated with carbofuran appears to have decrease dramatically in recent years. This may be because of the phase-out of granular carbofuran begun in 1991 and other regulatory use restrictions that have been imposed since then. The number of incidents attributed to diazinon have steadily increased and is now at a all-time high. The number of casualties associated with diazinon incidents have remained fairly constant. The 1989 ban on the use of diazinon on sod farms and golf courses has been ineffectual in curbing the frequency of diazinon bird kills, although there appears to have been a reduction in the number of very large kills. Incidents attributed with brodifacoum have exploded in recent years, making it second only to diazinon in the number of incidents reported in the past five years. Brodifacoum, which has become widely used as a rodent control, poses an extreme hazard to raptors and other scavengers that feed on the killed rodents. Death results from anticoagulation caused by residues brodifacoum, or an active metabolite, that persist in the bodies of the dead rodents.

Birds account for 98.8% of the total number of casualties in the EIIS. By far the greatest number of reported bird casualties have been of waterfowl. The most frequent waterfowl species affected are the Canada goose, the American wigeon, the mallard, and the brant (see tables for scientific names). These species are frequently killed, often in large numbers, when flocks graze on treated grass or alfalfa, or feed on waste grain in treated fields. Songbirds also suffer large mortality by pesticide poisoning. Those most impacted are ground-feeding species associated with agriculture or open habitats, such as sparrows, starlings, grackles, blackbirds, and robins. The numerous reported mortality incidents with the yellow-rumped warbler all occurred in California vineyards and are attributed to carbofuran poisoning. Finally raptors are heavily impacted by pesticides through secondary poisoning. Raptors with the most number of reported casualties are the red-tailed hawk, the bald eagle, the great-horned owl, and the Cooper's hawk. Kills of smaller species, especially small mammals, are less likely to be reported than those of large birds, and thus are probably under-represented in EIIS data.

### **Conclusions**

- ◆ Most wildlife mortality incidents are caused by organophosphorous and carbamate insecticides and anticoagulant rodenticides and avicides.
- ◆ Better investigation of wildlife incidents is needed to improve the identification of treatment sites.
- ◆ Treatment sites associated with the most reported wildlife incidents are residential and urban areas, golf courses, grain crops (corn, rice, and wheat), grapes, and alfalfa.
- ◆ Based on reported incidents, the leading pesticides in causing wildlife mortality are carbofuran, diazinon, fenthion, brodifacoum, chlorpyrifos, and ethyl parathion. Greater regulatory action should be considered to reduce the risk of these pesticides to wildlife. In particular, action restricting the use of diazinon and brodifacoum is urgently needed to curb the increasing number of mortality incidents they are causing.
- ◆ Birds that suffer the greatest number of casualties from pesticide poisoning are waterfowl, followed by ground-feeding songbirds associated with open habitat. Raptors are also commonly killed through secondary poisoning.

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#### Number of Wildlife Incidents

Pesticide	Unknown	Before 1979	1979-1983	1984-1988	1989-1993	1994-1998	Total
Diazinon	0	10	22	38	36	75	181
Brodifacoum	0	0	0	0	3	38	41
Carbofuran	0	19	6	63	124	18	220
Chlorpyrifos							
4-Amino-pyridine							
Fenthion							
Ethyl parathion	1	7	4	4	7	0	23

#### Number of Total Casualties

Pesticide	Unknown	Before 1979	1979-1983	1984-1988	1989-1993	1994-1998	Total
Diazinon	0	759	559	1216	407	590	3531
Brodifacoum	0	0	0	0	7	44	51
Carbofuran	0	6510	640	4405	5130	675	17,360
Chlorpyrifos							
4-Amino-pyridine							
Fenthion							
Ethyl parathion	50	409	2121	23	115	0	2718

